VINE-MESQUITE for EROSION CONTROL on Southwestern Ranges

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VINE-MESQUITE FOR EROSION CONTROL ON SOUTHWESTERN RANGES

By Barnard A. Hendricks, *associate range examiner, Southwestern Forest and Range Experiment Station, Forest Service*

Many extensive areas in the Southwest, on which white men found good grass when they began grazing large herds of cattle and flocks of sheep, have suffered deterioration and some have even become desertlike because of overgrazing and resulting soil erosion. Accelerated surface run-off from deteriorated slopes has not only carried away the shallow topsoils of these slopes, but has also destroyed the deep soils of many alluvial valleys which once supported a luxuriant growth of tall grasses. Some of the most striking manifestations of soil erosion are arroyos, newly cut channels, and gullies in low alluvial valleys and in small valleys and glades of woodland and pine forest in Arizona and New Mexico. Some of these eroded valleys are now barren wastes or have badland features.

Soil erosion has been kept under control on the slopes and lowlands that still have protective vegetation. In districts where the lands have been protected, the glades and valleys which are well grassed and receive run-off from the protected slopes are not dissected by gullies and arroyos. In contrast, in districts where the vegetation on the slopes has suffered deterioration from overgrazing, the resulting accelerated run-off from such slopes, which commonly concentrates in road ruts and livestock trails, has formed deep gullies and arroyos even in the valleys where some grass remains.

Grasses are the most effective plants for protecting the ground surface from soil-erosion forces on ranges in general as well as in glades and valleys; and grasses constitute the principal part of the vegetation on range lands where gullying and other forms of soil erosion have been brought under control through natural revegetation. Vine-mesquite (*Panicum obtusum*) is one of these grasses. In fact, vine-mesquite, within its range, may be regarded as one of the best native southwestern grasses for use in revegetating deteriorated range lands and in controlling soil erosion. It forms a good protective ground cover in and along drainage depressions, thus indicating its suitability for such use.

Characteristics of Vine-mesquite

Description.—Vine-mesquite, also locally known as "vine panic" (grass), "grapevine-mesquite", and "wiregrass", belongs to the millet tribe (*Paniceae*) of the grass family (*Poaceae*). The name "vine-mesquite" is commonly applied to this grass because of its long vinelike stolons and because of its association with mesquite trees (*Prosopis* spp.), especially in western Texas.

Vine-mesquite is a perennial grass that is tufted from a more or less knotted rootstock. Its widely creeping stolons sometimes grow 8 or 10 feet in length and may commonly have 10 or 12 swollen nodes cov-

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ered with soft hairs. These nodes take root to form new plants. The short, erect culms bear narrow, spikelike panicles of blunt spikelets. The spikelets are two-flowered, bearing a sterile (staminate) floret below the upper, perfect (fertile) floret. Its leaf blades, which are firm and commonly pointed at the tip, vary in width from one-eighth to one-fourth of an inch, and in length from 2 to 8 inches (fig. 1).

Range. — Vine-mesquite has an extensive range. It occurs in Arizona, southern Colorado, Kansas, western Missouri, Oklahoma, Texas, New Mexico, and Mexico. It is most abundant, however, in moist places in regions of mild climate, as at medium-low elevations in Arizona, New Mexico, and western Texas. In the lower valleys and on the low plains it is confined to areas that have alluvial soils and are sometimes watered naturally or irrigated only occasionally. Thus it is commonly found along sandwashes, irrigation ditches, and stream banks. In the higher valleys, on the higher plains, and on tablelands it grows in and along the drainage depressions, as in the glades throughout the woodland zone and in the lower parts of the pine-forest areas. Remnants of vine-mesquite are commonly found along the banks of gullies and arroyos wherever there is still some of the original cover of perennial grasses.

FIGURE 1.—Vine-mesquite (*Panicum obtusum*).

Forage value.—The leaves and flower stalks are readily eaten by livestock when they are tender and green. But after maturity, when the leafage has dried out and the stalks are woody, animals prefer grama and other forage grasses that remain palatable throughout the fall and winter and commonly occur on the drainage slopes of the depressions in which vine-mesquite grows.

On deteriorated ranges where palatable forage is scarce, however, livestock will eat the dry stalks and stolons of vine-mesquite and thus destroy any new plants that might have started to take root at the stolon nodes. Continued overgrazing of ranges on which the vegetation is already deteriorated will not only prevent vine-mesquite from gaining a foothold, but will also result in the elimination of all perennial forage grasses.

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Soil-protection value.—Vine-mesquite makes a very effective ground cover, because, after it becomes well established, its stolons, culms, and leaves, which together form a matlike covering, protect the ground surface from the erosive action of water (fig. 2).

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FIGURE 2.—Flood waters sweep over this dense matlike cover of vine-mesquite in a valley drainage without eroding the soil.

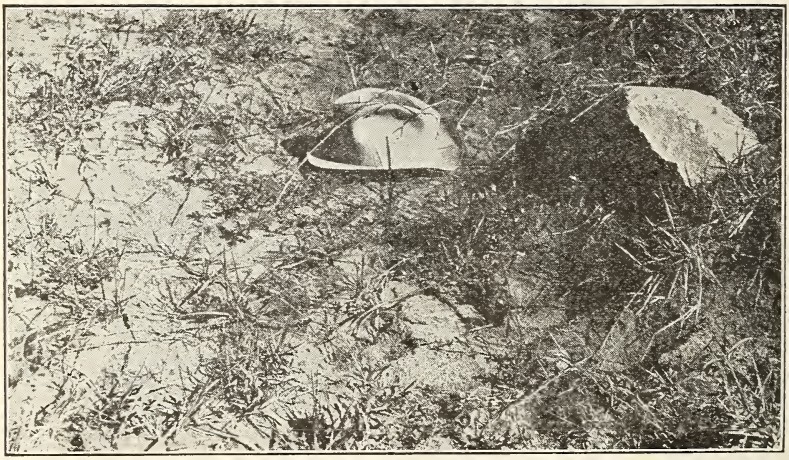

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FIGURE 3.—Vine-mesquite advancing upon a bare area. In this advance, the network of long wiry stolons binds the soil material and retards both wind and water erosion.

This grass is particularly well suited for use in revegetating gullies and arroyos, either naturally or artificially. It grows rapidly and its runners creep up and down steep slopes. The new plants taking root at the nodes of the runners and nourished and supported by the parent plants can become established on steep dry banks and develop a cover that will protect the banks from excessive side-cutting. (See cover illustration.) On areas that are not too heavily grazed, it will creep over bare eroded land (fig. 3) and establish many new plants where seedlings of other species would have a poor chance of surviving.

Natural Revegetation

Largely because of its ability to reproduce by means of stolons, vine-mesquite is one of the first grasses within its range naturally to reoccupy gullies, arroyos. and other eroded areas when they are protected from grazing.

Three examples which show the value and suitability of vine-mesquite for use in reclaiming eroded areas were observed in 1931, when an erosion survey was made of the upper Rio Grande watershed.

Revegetation and sand-washes.—On a range located just inside the east boundary of the San Mateo division of the Cibola National Forest in central New Mexico, an abundance of vine-mesquite was found in sandy washes which were once only shallow drainage ways. Prior to 1927, this range had been overstocked and overgrazed by cattle. In 1927 a change in range use was made—a shift from year-long to seasonal grazing—and the number of cattle was reduced to conform to the supply of available forage on the range. Inasmuch as the range was thereafter used only during the fall and winter months, the vegetation soon responded to the protection that was given it during the summer growing season. Such management, which resulted in natural revegetation, not only increased the grazing capacity[1] of the range but checked soil erosion as well.

Revegetation of arroyos.—Conditions somewhat similar to those just described were observed on the Fields ranch, on the Rio Salado. 30 miles north of Magdalena, N. Mex., where the vegetation consisted principally of sacaton and vine-mesquite grasses. Prior to 1931 pastures of this ranch had been given sufficient protection through conservative stocking to result in a very striking contrast between the vegetation on them and on the outside overgrazed range. To illustrate: Only about 5 or 10 percent of the ground surface on the range outside one of the pastures was covered with live vegetation, and active soil erosion was evidenced by recent gullying and the disappearance of topsoils. In the conservatively grazed pasture there was little or no evidence of active soil erosion, and 30 or 40 percent of the ground surface was covered by living vegetation. The absence of any signs of recent active soil erosion showed that a cover thus preserved not only protects the ground surface but also retards surface run-off and aids in the absorption of water by the soils. Furthermore, its grazing capacity per unit area was at least five times that of the outside range.

An arroyo originating on the open range and extending through the protected pasture showed in marked contrast the condition on the range outside and inside this pasture. On the open range the arroyo was about 5 feet deep and 30 feet wide, and its bare banks were gullied by surface run-off from the surrounding valley floor, whereas in the pasture even the bottom of the arroyo channel was in places revegetated with vine-mesquite and sacaton grasses. These grasses, by retarding run-off, had caused the deposition of silt which resulted in the filling in of the arroyo channel until by 1931 it was only about 2 feet deep.

[1] By "grazing capacity" is implied the number of stock of given class or classes which a range unit will support each season, year after year, without injury to the range or other land resource.

Revegetation of pastures.—Another example of lands on which the herbaceous vegetation had suffered deterioration through overgrazing in the past and on which revegetation has set in is a large pasture on the Lee Evans ranch east of Mount Taylor in western New Mexico. According to Mr. Evans, erosion in this pasture had been very active for several years prior to 1927. This was attributed to a decline in the grass density which resulted from overstocking, particularly during dry years. From 1927 to 1931 the pasture was not grazed during the growing season and only conservatively grazed in the winter. Such use resulted in revegetation which, in 1931, had progressed to the stage where the arroyos were being reclaimed by vine-mesquite and bluestem (*Agropyron smithii*), as is shown in figure 4.

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FIGURE 4.—Range recovery in a conservatively grazed winter pasture, evidenced by the reclaiming of eroded areas by bluestem and vine-mesquite grasses.

It is true that winter grazing was practiced on all three of the ranges that have been cited as examples of natural revegetation setting in as the result of conservative use. Nevertheless, it is believed that natural revegetation will also take place on semidesert ranges that are conservatively grazed year long. On ranges given such management the grasses are not eaten too close to the ground; that is, sufficient leafage is left to protect the soils from erosion and to aid in the conservation of moisture. This means that about 25 percent of the grass growth is left at the end of the grazing season. Under such conditions vine-mesquite, as well as other native grasses, are able to make their normal growth.

On all the semidesert ranges that have been mentioned as examples, vine-mesquite was found to be prominent among the grasses that grow along and in arroyos—areas that are most susceptible to erosion, because here the accelerated run-off from uplands concentrates. This fact shows the especial value of this grass for the revegetation of gullies in connection with erosion-control work.

Other examples of natural revegetation.—Vine-mesquite is also an important grass among those that naturally revegetate small

glades in woodland areas on the watershed from which the town of Silver City, N. Mex., obtains its water supply. By 1927 overgrazing and other destructive influences, which began years ago with the early development of mining properties, had caused excessive deterioration of the vegetation, particularly the grasses. In fact, arroyo and gully erosion had progressed so far, floods had become so destructive, and the water situation so acute, that this drainage area was closed to grazing in the year mentioned. In 1933 a Civilian Conservation Corps unit was assigned to erosion-control work on this watershed. Since that time several thousand check dams have been constructed in gullies and arroyos in order to check soil erosion and to aid natural revegetation. Revegetation is very necessary to effect permanent control of surface run-off and thereby improve the water supply.

In the watershed referred to and on many areas in the vicinity of Silver City are excellent examples of the suitability of vine-mesquite for the revegetation of gullies and arroyos in which active erosion is temporarily controlled by artificial works, such as check dams. In 1933 where vine-mesquite was already established along the banks of gullies and arroyos the stolons had in some places extended down the banks and onto the silt deposits that had partly filled the channels above the dams. By the summer of 1935 a network of stolons had almost covered many of these silt deposits and had extended up the gullies and arroyos; and the grass, as it advanced, effected deposition of silt farther up the channels. Inasmuch as such spreading results in the development of protective vegetation on the bottom of the channels and affords protection to the banks, undoubtedly the useful life of these dams will be greatly prolonged.

West of Pleasant Valley, on the Tonto National Forest in central Arizona, vine-mesquite is growing in small gullies formed by surface run-off where the natural vegetation has deteriorated from continual too-close grazing. This shows the value of vine-mesquite for use in revegetation of small, newly formed gullies on such deteriorated ranges. Revegetation of the larger and older gullies will take place slowly. But vine-mesquite, because of its growth habits, may be expected to hasten revegetation more than most other grasses. The best results in revegetation work can be obtained only if there is protection from overgrazing. This is as true of revegetation with vine-mesquite as it is of revegetation with any other palatable plant. On the Verde River watershed above Campe Verde in north-central Arizona, where grasses have revegetated naturally, following protection from overgrazing, vine-mesquite is prominent and has formed an excellent cover in and along many drainage depressions.

Artificial Revegetation

Vine-mesquite is particularly well adapted for the revegetation of eroded areas—either through the use of seed or transplants, or both—because of its habit of spreading rapidly even on areas where other grasses fail to gain a foothold.

What are commonly considered the seeds of vine-mesquite are actually the hard outer coats within which the true seeds are concealed. The one-seeded spikelets, which usually ripen in August or September, are larger than those of most grasses and for this reason can be

easily stripped from the stalks. Thus the gathering of seed need not be a particularly difficult task. Seeding, however, is rather uncertain because of the relatively low viability of the seed. Various tests have made it clear that only under the most favorable conditions will the seed attain a 30-percent germination and that 10 to 15 percent is about average good germination. The best germination in tests made was obtained from seed that had been pierced with a knife, or scarified.

Seedlings grown from seeds or transplants from stolon shoots of vine-mesquite can be successfully transplanted. If grown in small paper containers, their shipment and transfer to new locations is facilitated. Plants grown in this manner at the Forest Service C. C. C. nursery at the Boyce Thompson Arboretum near Superior, Ariz., have been successfully transplanted at the Parker Creek branch station, 70 miles north of the arboretum.

The advisability of considering the complete covering of extensive areas with transplants as a means of reclaiming such areas may, however, be questioned because of cost. A few transplants of most semidesert grasses scattered over an eroded area could not be expected to furnish the protection to soils and to effect the control of surface run-off that would be necessary to promote the spread of such plants. Such spot transplanting with vine-mesquite, however, has encouraging possibilities for the revegetation of extensive areas that have suffered from sheet erosion or have become dissected by gullies and arroyos, for three reasons: (1) The grass spreads rapidly; (2) it can be established under adverse conditions; and (3) only a few plants well established on a given spot are needed to form a nucleus from which natural revegetation of adjacent bare areas may take place.

On deteriorated areas where there is still some vine-mesquite, it may pay to encourage its growth by protection from overgrazing rather than by seeding or transplanting. Such protection will pay big dividends; it will result in preventing the destructive erosion of the alluvial soils of swales and valleys and will greatly aid in range restoration.

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